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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/623,665

07/21/2003

Lawrence C. West

107262.199US1 and
7090/P0

5061

7590

04/18/2005

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EXAMINER

KIELIN, ERIK J

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 04/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/623,665	WEST ET AL.	
	Examiner	Art Unit	
	Erik Kielin	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 32,34,48-54 and 335 is/are pending in the application.
- 4a) Of the above claim(s) none is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 32,34,48-54 and 335 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 May 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11/5/03 2/9/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION***Election/Restrictions***

1. Applicant's election of the invention of Group II, claims 32, 34, 35, and newly added claims 48-54, in the reply filed on 31 January 2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Cancellation of the claims drawn to Group I is acknowledged. Accordingly, there presently exist no withdrawn claims.

Drawings

2. The drawings are objected to because in Fig. 1, " S_2O_2 " should be $\text{--SiO}_2\text{--}$ for correct chemical nomenclature. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

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the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claim 48 is objected to because of the following informalities:

in line 2, after "substrate," insert --and-- for clarity.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 32, 34, 35, and 48-53 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 32 recites the limitation "the first set" in line 5. There is insufficient antecedent basis for this limitation in the claim.

Claim 32 recites the limitation "the first carrier substrate" in line 10. There is insufficient antecedent basis for this limitation in the claim.

The remaining claims are rejected for depending from the above rejected claim 32.

Claim 48 is additionally indefinite for the limitation, "creating the top surface involves forming a first semiconductor layer **above the front side of the carrier substrate.**" (Emphasis added.) But independent claim 32 recites the limitation, "providing a **carrier substrate** made at

least in part of a **first semiconductor material** and having a front side and a backside.”

(Emphasis added.) As presently written, it is unclear how “a first semiconductor material” can simultaneously be part of the carrier substrate while also being formed “above the front side of the carrier substrate.”

For the purposes of patentability, the claims will be interpreted as best understood.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 32, 34, 35, 48-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,987,196 (**Noble**) in view of US Patent Application Publication 2002/0146865 A1 (**Hoel**) and US 5,098,861 (**Blackstone**).

Regarding claims 32, 48 and 51-53, **Noble** discloses a method of producing an optical-ready substrate on which microelectronic circuitry can later be fabricated, said method comprising:

providing a carrier substrate **14** made at least in part of a first semiconductor material and having a front side and a backside (Fig. 1);

by using the first set of semiconductor fabrication processes (e.g. Figs. 2A-8), fabricating optical signal circuitry **12, 22, 23, 24, 27** on the front side of the carrier substrate **14** designed to provide signals to the microelectronic circuitry **16, 18** to be fabricated thereon at a later time,

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said optical signal circuitry made up of semiconductor photonic elements **22, 23, 24, 27** interconnected by an optical waveguide **12** for carrying an optical signal characterized by a wavelength of about 850 nanometers or less, and wherein the first carrier substrate **14** may be silicon (col. 3, lines 3-5) --as further limited by instant claim 51-- (Fig. 1; col. 3, lines 1-28); and creating a top surface **20** by fabricating an SOI structure having a first semiconductor layer **20** above the upper/front side of the carrier substrate **14**, (col. 3, lines 17-22; col. 5, line 52 to col. 6, line 11) --as further limited by instant claims 35 and 48-- above the optical signal circuitry **22, 23, 24, 27** that is of sufficient quality to permit the microelectronic circuitry **16, 18** to be fabricated thereon using a second set of semiconductor fabrication processes (col. 6, lines 12-50). (See also a different embodiment shown in Fig. 9.)

Note that the core **38** of the waveguide **12** (Fig. 2A) is made from PSG (phosphorous doped silicon glass), in one embodiment, with the phosphorous doping varied to control the light-transmission characteristics (paragraph bridging cols. 4-5). Glass is silicon dioxide or silica --as further limited by instant claims 52 and 53. Accordingly, the optical waveguide is adapted to carry an optical signal of 850 nm or less, as admitted by Applicant in the instant specification, at p. 10, lines 16-19.

Noble does not indicate that the optical-ready substrate is sent to a purchaser that will subsequently fabricate microelectronic circuitry thereon by using a second set of semiconductor processes.

Hoel teaches the benefits of turn around time and cost reduction by semi-customizing integrated circuit fabrication wherein a first set of commonly used, or shared, fabrication processes are used to partially fabricate standard portions of integrated circuits shared among

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many final integrated circuit designs which are stored in inventory and are available for later customization using a second set of fabrication processes (paragraphs [0004] and [0021]).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the first set of fabrication processes of **Noble** forming the optical signal circuitry and to use the second set of fabrication processes to customize the device, in order to reduce the turn around time and reduce costs, as taught by **Hoel**.

Then the only difference is that **Noble** and **Hoel** do not indicate that the partially fabricated wafer is sold to a purchaser for fabricating the microcircuitry.

Blackstone teaches that it is known to partially fabricate a semiconductor wafer and then sell the partially fabricated wafer to a “ ‘conventional’ semiconductor manufacturer who will complete the semiconductor fabrication process utilizing traditional planar semiconductor fabrication techniques.”

It would have been obvious for one of ordinary skill in the art, at the time of the invention to sell the partially fabricated wafer of **Noble** to enable customization of the microcircuitry for a given application, as taught by **Hoel** and **Blackstone**. One of ordinary skill would be motivated to sell a partially fabricated wafer to make additional money and in order to specialize in the area of fabricating only the optical circuitry without having to carry the additional expense of having a microcircuitry plant which are typically exceedingly expensive to start-up and maintain.

Regarding claim 34, **Noble** discloses that the devices of Figs. 1 and 9 include fabricating the optical signal circuitry an optical clock signal distribution network, as part of the optical signal circuitry (col. 9, line 22 to col. 10, line 35).

Regarding claims 49 and 50, **Noble** does not indicate the details of forming the silicon-on-insulator (SOI) structure on which the microcircuitry is fabricated.

Blackstone teaches a method of forming a microcircuitry portion of an SOI wafer involves forming an oxide layer **106** on a second semiconductor wafer **100** which is then brought into contact with the top surface of the first semiconductor wafer and bonded. The second semiconductor wafer is then thinned (Fig. 4A; col. 4, lines 62).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to form the SOI structure of **Noble** by the method of **Blackstone** because **Noble** is silent to the exact method such the one of ordinary skill would benefit from using known methods, such as that in **Blackstone**, to save time and money in research and development.

8. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Noble** in view of **Hoel** and **Blackstone** as applied to claims 32, 34, 35, 48-53 above, and further in view of US 5,195,161 (**Adar** et al.).

The prior art of **Noble**, as noted above, uses phosphorous, as the dopant in the silica core **38** to control the characteristics of the light transmission of the waveguide **12**. **Noble** does not indicate that Ge, as GeO_2 , is used as the dopant.

Adar teaches that P, Ti and Ge are commonly known dopants for use as a waveguide core material of silica. Each is necessarily present as the oxide, e.g. TiO_2 , and GeO_2 .

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use Ge as GeO_2 as the dopant of the silica core of **Noble**, because GeO_2 would appear to work just as well as P_2O_5 for the purpose of controlling the light transmission characteristics. In this

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regard, it has been held that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) (Claims to a printing ink comprising a solvent having the vapor pressure characteristics of butyl carbitol so that the ink would not dry at room temperature but would dry quickly upon heating were held invalid over a reference teaching a printing ink made with a different solvent that was nonvolatile at room temperature but highly volatile when heated in view of an article which taught the desired boiling point and vapor pressure characteristics of a solvent for printing inks and a catalog teaching the boiling point and vapor pressure characteristics of butyl carbitol. "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig - saw puzzle." 65 USPQ at 301.). See also *In re LESHIN*, 125 USPQ 416 (CCPA 1960) ("Mere selection of known plastics to make container-dispenser of a type made of plastics prior to the invention, the selection of the plastics being on the basis of suitability for the intended use, would be entirely obvious; and in view of 35 U.S.C. 103 it is a wonder that the point is even mentioned.") (See MPEP 2144.07.)

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 4,966,430 (**Weidel**) and US 5,485,021 (**Abe**) disclose devices having optical circuitry below microelectronic circuitry.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 571-272-1693. The examiner can normally be reached from 9:00 - 19:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Erik Kielin
Primary Examiner
April 17, 2005